Proceedings of the Iowa Academy of Science

Volume 63 | Annual Issue Article 46

1956

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In 1931 the Fort Dodge Limestone Company was organized for the purpose of obtaining rock from a mine located in the S. W.¼, Sec. 24, T. 89N., R. 29W., Webster County, Iowa. Mining of this rock has been essentially continuous since that time. The rocks penetrated by the mine shaft and the working face have been described by Wood (1933). The petrography of the rocks of the working face has been described by Weissmann (1953), and by Roy, Thomas, Weissmann, and Schneider (1955).

Although all workers have agreed that the rocks of the mine are of Mississippian age, no agreement has been reached as to the precise stratigraphic placement of this sequence within this system. The rock of the working face is known to be a lenticular body with a maximum thickness of about 18 feet. Lateral contacts are controlled along the south side by a graben-type fault with a minimum displacement of about 120 feet. This displacement brings Pennsylvanian shales in contact with the Mississippian rocks. In the other directions the mine rock thins out to thicknesses of six feet or less so that commercial exploitation is no longer feasible.

At the present time, mining has proceeded far enough so that it can be seen that rock of good quality and commercial quantity is soon to be exhausted. The economics of the situation demanded that an exploration project be undertaken to look for new reserves or, to anticipate cessation of operation.

This problem was brought to the attention of the authors and a preliminary geologic investigation was initiated. A study of the published geologic information seemed to indicate two things. First, that the Gilmore City formation, with a thickness of about 90 feet has been penetrated in several wells of the Fort Dodge area; and second, that this formation ought to occur at a depth of about 35 feet beneath the floor of the present mine. On the basis of the preliminary study it was recommended that the Fort Dodge Limestone Company make a series of core tests to explore the quantity and quality of rock beneath the mine floor. This suggestion was followed, and early in 1955 coring equipment was lowered into the mine.

One core was extended to a depth of 167 feet below the mine floor for a total of about 279 feet beneath the surface level. One core penetrated 127 feet and two other cores of somewhat lesser

lengths were taken to corroborate the presence of the rock penetrated in the initial core. These cores demonstrated not only the presence of the Gilmore City formation, but also that this formation occurs at depths beneath the mine floor which make it economically feasible to exploit. At this time the Fort Dodge Limestone Company has started excavation to tap this Gilmore City reserve.

Because it is thought that these cores penetrate the entire thickness of the Gilmore City formation of the Fort Dodge area, and because this core, to the best of our knowledge, offers the first opportunity to obtain a good insight into the characteristics of the formation, this opportunity is taken to place in the record a description of this core. Some suggestions as to the stratigraphic relationships of this formation are also added.

The following description records the lithologies penetrated in the 167 foot core.

Elevation of mine floor 910 feet

Bed	Description	Thickness in feet
1.	Siltstone and dolomite, blue-gray, laminated	1.9
2.	Calcite and chert, white, interspersed clay layers.	1.1
3.	Dolomite, blue-gray, earthy, glauconitic, laminated, occasional stylolite and shaly parting.	9.9
	—depth 12′.9—	
4.	Dolomite, gray, earthy, pyritic, laminated, glauconitic	6.0
5.	Calcareous dolomite, light gray to brown, dense, calcite clots abundant lower 1 foot.	5.4
	—depth 24′.2—	
6.	Dolomite, light-gray, vugy, stylolitic, brecciated, slightly cherty	4.7
—	Top (?) Gilmore City formation—	
7.	Limestone and dolomite breccia, light gray, dolomite sugary, limestone lithographic.	1.2
8.	Limestone, oolitic (¼ mm.) and pisolitic (4 mm.), dense, sparsely pyritic, occasional stylolite	2.0
	—depth 32′.2—	
9.	Limestone, oolitic, fine-grained, brecciated.	1.3
10.	Dolomitic limestone, dark gray, pyritic, glauconitic, porous, massive, brecciated.	1.5
11.	Limestone, oolitic, light gray, dense, ¼ mm. oolites, flecks of calcite up to 4 mm., glauconitic and pyritic.	17.2
	—depth 52′.2—	
12.	Limestone, oolitic, light gray, ¼-½ mm. oolites.	10.2
13.	Limestone, oolitic and pisolitic, firm, massive, oolites ½-1 mm., pisolites up to 7 mm., occasionally vugy. Fragments of brachiopods, gastropods, algae, and corals. Calcite masses up to 4 mm.	14.2
	—depth 77′.2—	
14.	Limestone, oolitic, light gray, ¼ mm. oolites, dense, laminated, cross-bedded (?).	30.0
15.	Limestone oolitic, light gray, ¼ mm. oolites, firm, stylolitic, gastropod, brachiopod, and algal debris.	4.7
16.	Limestone, light-gray, ¼-½ mm. granular calcite, conchoidal fracture.	0.9
17.	Limestone, oolitic, light gray, ½ mm. oolites, few 2-3 mm. oolites or pisolites, algae, coral and crinoid fragments, endothyroid (Plectogyra (?) Foraminifera.	7.5
—	Base Gilmore City formation—depth 120′.0	
18.	Dolomitic limestone, ligh gray, earthy to sugary.	3.3

19. Limestone, gray, hard, stylolitic.	1.2
20. Dolomite, light gray, fine, porous	3.6
21. Calcareous dolomite, light brown, stylolitic, medium bedded. Few green shale stringers. A six inch chert band at depth of 137 and 140 feet, and a four inch chert band at a depth of 150 and 149 feet.	34.0
22. Dolomite, dark gray, porous, cherty, soft, numerous calcite masses. To base of core	5.0

—depth 167′—

The following chemical and physical properties for the main portion of the Gilmore City formation were determined by the Iowa State Highway Commission.

	Chemical Analysis			
	42-59.5′	59.6-78.6′	78.6-97.1′	97.1-117.1′
SiO_2	0.50	1.30	0.30	0.70
R_2O_2	0.34	0.33	0.20	0.30
CaO	55.16	55.21	55.66	55.21
MgO	1.06	0.00	0.32	0.25
CO_2	42.62	43.69	43.64	43.33
$CaCO_3$	98.78	98.90	99.30	98.54
	Physical Analysis			
16c	F&T 2.1	1.2	0.9	1.1
25c	F&T 0.6	0.6	0.7	0.8
LA	26	26	27	35

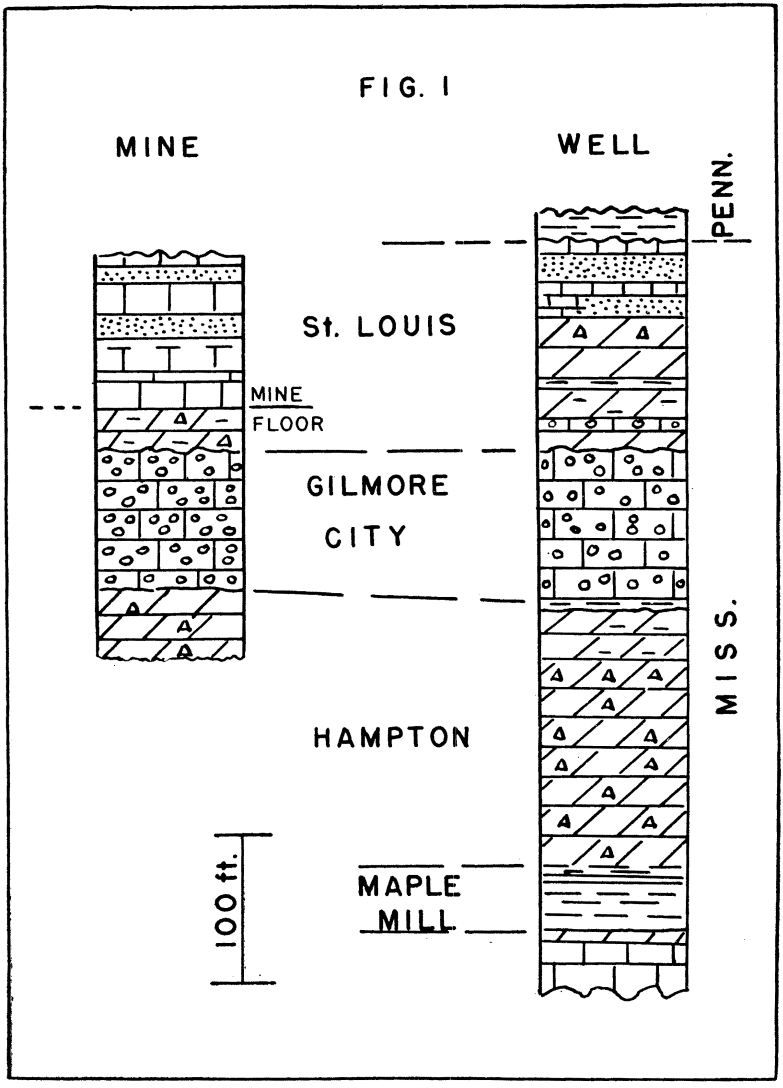
Discussion of the core

The origin of the breccia that occurs in beds 7-10 seems subject to question, however correct solution of its origin has considerable bearing on the stratigraphic assignment of the section. The breccia of bed 8 contains angular fragments of lithographic limestone with diameters up to one inch, which are set in a matrix of oolites and pisolites. The boundaries around some of the breccia fragments are very sharp. Elsewhere within the same specimen, boundaries between the components exhibit oolites extending into and gradually disappearing within the lithographic fragments. In bed 7, similar relations exist between dolomite concentrations and the lithographic fragments.

The possibility of this being a tectonic breccia is eliminated because of the restricted vertical occurrence. The contact relationships seem to substantiate equally the interpretation of an intra-formational conglomerate, a solution, or a replacement breccia. For this reason, an unconformity at the top of the oolitic limestone is not unmistakably indicated.

In spite of being unable to resolve the question of whether the breccia has stratigraphic significance nevertheless, lithologically the core is capable of division into three stratigraphic units. These are: Unit 1 to include beds 1-6; Unit 2 to include beds 7-17; and, Unit 3 to include beds 18-22.

A comparison and correlation of the mine shaft section with the section penetrated in the Fort Dodge City well #14 (Fig. 1.) allows the following interpretations.** The precise placement of Unit 1, and the rocks of the working face is questionable. Wood (1933)



expressed the opinion that this interval is separable from the overlying St. Louis formation by an unconformity, as signified by a cherty breccia. No information that would confirm or deny this interpretation was obtained during this investigation.

Unit 2, the Gilmore City formation, maintains similar lithologic and thickness characteristics between the two sections. This interval, with a thickness of about 100 feet is uniformily oolitic from top to bottom. The ooliths have a rather uniform diameter of ¼-½ mm. throughout. This homogeneity suggests desposition under an en-

vironmental condition that remained rather constant for a long interval of time.

Figure 1 records only a selected interval of the Fort Dodge City well. The entire log of this well records, in addition to that shown here, 120 feet of Pleistocene, 139 feet of Pennsylvanian, and 270 feet of limestone and dolomite beneath the Maple Mill shale. The few pisolitic and fossiliferous bands indicate that this uniformity of environment was interrupted but two or three times during the deposition of the entire unit.

Evidence is not available to substantiate Laudon's (1933) claim that the Gilmore City oolite has a thickness of 210 feet in the Fort Dodge area.

Study of the core has yielded no information to add to the controversy as to whether the Gilmore City oolite should be assigned to the Kinderhookian or to some higher series within the Mississippian system.

Unit 3 is assigned to the Hampton formation and its correlatives. The Hampton formation has a thickness of about 180 feet in this area.

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